Two New Mesoamerican Species and a New Combination in *Huperzia* (Lycopodiaceae)

Benjamin Øllgaard
Department of Systematic Botany, Institute of Biological Sciences, Aarhus University, 68 Nordlandsvej, DK 8240 Risskov, Denmark

ABSTRACT. Two new species of Lycopodiaceae, *Huperzia mesoamericana* and *H. talamancana*, are described as a result of revision of material for the pteridophyte volume of *Flora Mesoamericana*. The relationship of *H. talamancana* to *H. crassa* is discussed. A new combination, *Huperzia curvifolia* var. *parvifolia*, is proposed.

Huperzia mesoamericana B. Øllgaard, sp. nov. TYPE: Panama. Chiriquí: Cerro Hornito, epiphyte, in cloud forest, 6,200 ft., 8 May 1978, *Hammel 3061* (holotype, MO). Figure 1.

Species *Huperziae taxifoliae* (Swartz) Trevisan verosimiliter affinis, a qua differt foliis surculorum basalium 12–15 × 4–5 mm, ellipticis usque ad late lanceolatis, obtusis usque ad late acutis, et foliis surculorum dense sporangiferorum 6–8 × 2.5–3 mm, late lanceolatis, planis vel fere planis.

Pendent, up to 25 cm long; shoots slightly and gradually tapering from ca. 20–30 mm diam. including leaves at the base to 10–15 mm in distal divisions; stems (excluding leaves) 2–3 mm thick at the base; leaves gradually modified, borne in irregular, alternating whorls of 3, covering the stem; leaves of basal divisions spreading to perpendicular, elliptic to broadly lanceolate, obtuse to broadly acute, 12–15 × 4–5 mm, almost flat, firmly herbaceous to subcoriaceous, somewhat shining, with slightly revolute, entire margins; leaves of middle and distal divisions gradually smaller, more acute, more arcuately ascending, flat, with flat or slightly revolute margins; leaves of fully sporangiate divisions 6–8 × 2.5–3 mm; sporangia 1.5–2 mm wide.

Huperzia mesoamericana grows as an epiphyte in cloud forests, from 1,300 to 2,050 m, and is endemic to Costa Rica and Panama. It is a very distinct species of uncertain taxonomic affinity. Because it is a pendent epiphyte with gradually heterophyllous shoots and rather wide leaves of firm texture, this species is referred tentatively to the *Huperzia taxifolia* group of Øllgaard (1987, 1989). It differs from *H. taxifolia* by the shorter growth and more compact aspect, by the elliptic to widely lanceolate leaves, 12–15 × 4–5 mm, with obtuse to broadly acute apices, in the basal divisions of the plant, and by the leaves of the densely sporangiate distal divisions 6–8 × 2.5–3 mm, widely lanceolate and flat, with flat or slightly revolute margins. In contrast, *H. taxifolia* has linear-lanceolate to lanceolate leaves, 14–23 × 2–3 mm, in the basal divisions, and the leaves of the densely sporangiate distal divisions 3–8 × 1–1.5(–2) mm, lanceolate or narrower, usually with a widened and somewhat clasping base, and a long, narrow, involute apex.

Paratypes. COSTA RICA. CARTAGO: San Mateo et le chemin de Guacimo au bord de la mer du Pacifique, *Brenes, A. M. s.n.* (NY). ALAJUELA–PUNTARENAS–GUANACASTE: Cordillera de Tilarán, Monteverde, 1,300–1,400 m, Aug. 1978, *Dryer 1618* (F). PUNTARENAS: Monteverde, Veracruz river valley S of Reserve, Pacific slope wet forest, 10°15′N, 84°46′W, 1,300–1,500 m, 22 Aug. 1986, *Haber ex Bello & Clagget 5367* (MO). PANAMA. CHIRIQUI: Cerro Colorado, 1,600 m, 9 Aug. 1984, *Schmalzel 1997* (MO); Cerro Colorado, 11.2 km along ridge road from main road to Escopeta, 1,700 m, 16 Aug. 1977, *Folsom 4873* (MO).

Huperzia talamancana B. Øllgaard, sp. nov. TYPE: Costa Rica. San José: Cordillera de Talamanca, Cerro de la Muerte, Pan American Highway at km 91, Ericaceae–Chusquea scrub, 3,000–3,300 m, 25 Aug. 1983, *Hickey 898* (holotype, AAU). Figure 2.

Species *Huperziae crassae* (Humboldt & Bonpland ex Willdenow) Rothmaler affinis, a qua differt surculis basalibus homoblasticis, foliis (6–)8–11 mm longis, (1.5–)2–3 mm latis, ascendentibus usque ad laxe imbricatis, abaxialiter epidermide laevi et saepe nitida, vel interdum cellulis paucis protrusis pustuliformibus, non pruinosis.

Erect from an ascending base, forming large clumps, sometimes up to 60 cm tall; shoots homoblastic, homophyllous, equally thick throughout or slightly tapering, 7–15(–25) mm diam. including leaves; stem (excluding leaves) 3–5 mm thick; leaves borne in crowded, irregular, alternating whorls of (4–)5–7, spreading to arcuately ascending or loosely imbricate, lanceolate, (6–)8–11 × 2–3 mm (leaves of distal divisions sometimes 1.5–2 mm wide), with an inconspicuous to prominent, often prominently decurrent basal swelling (air cavity), abaxially flat

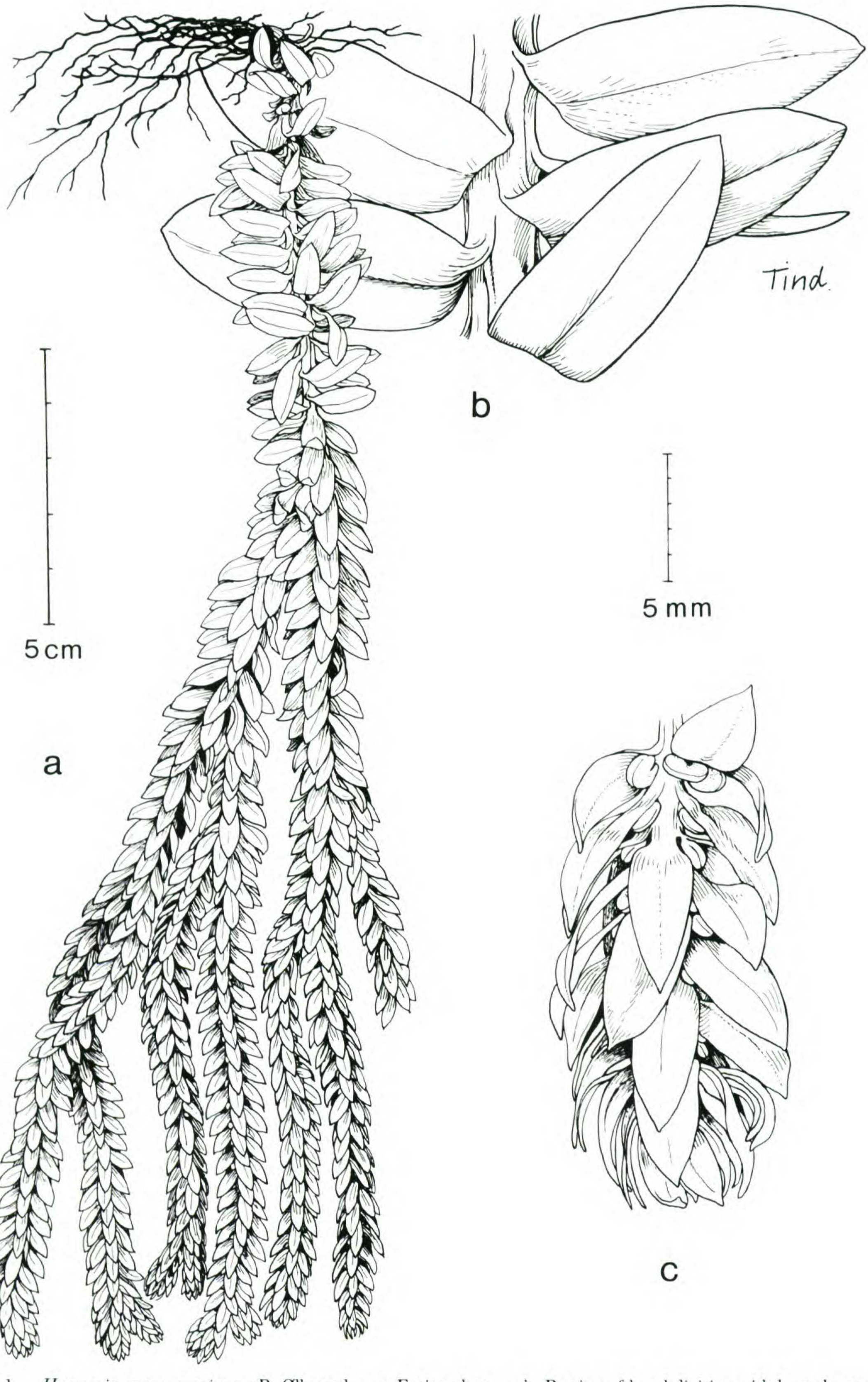

Figure 1. *Huperzia mesoamericana* B. Øllgaard —a. Entire plant. —b. Portion of basal division with large leaves. —c. Portion of distal, sporangiate division. (*Hammel 3061*, MO.)

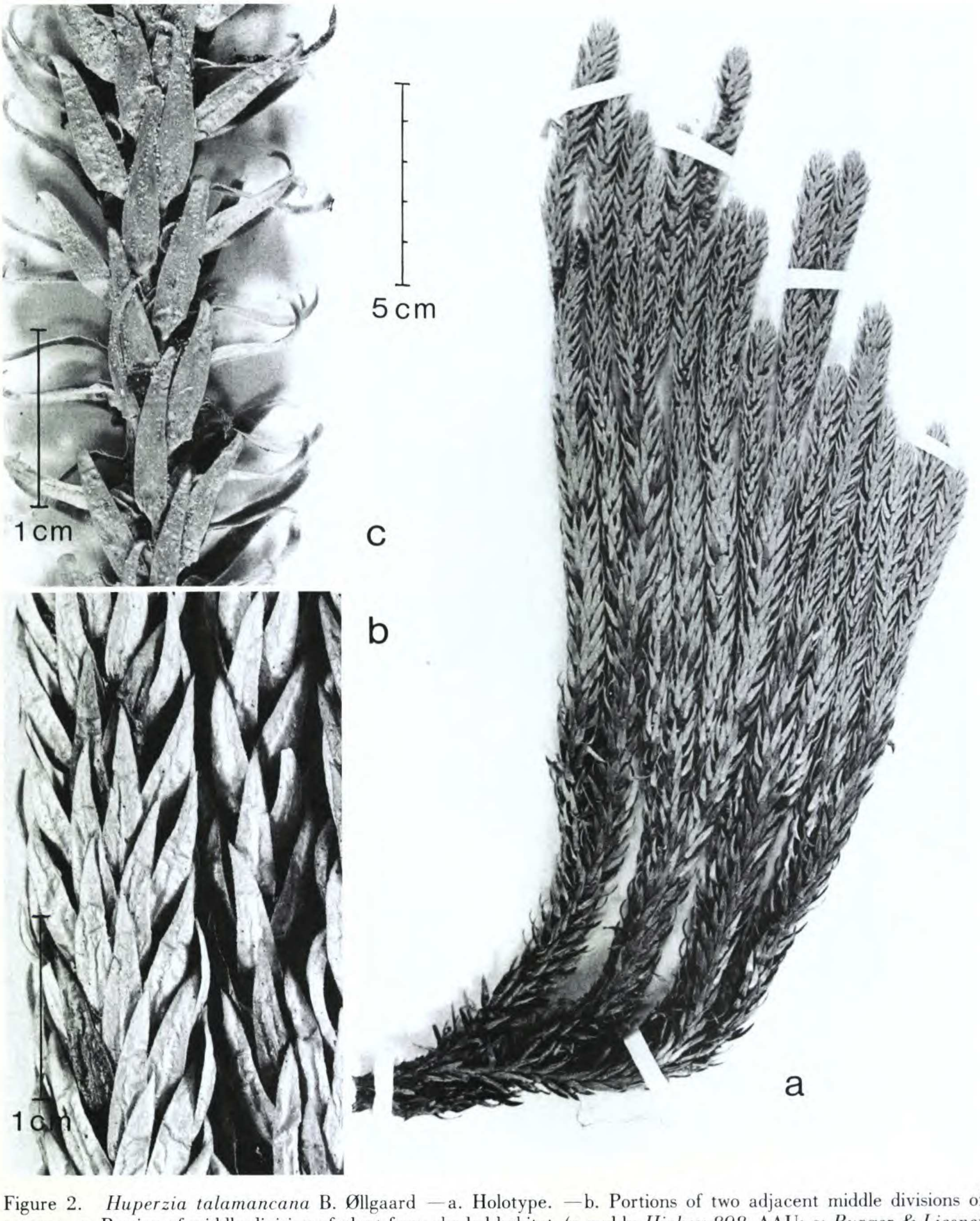

Figure 2. *Huperzia talamancana* B. Øllgaard —a. Holotype. —b. Portions of two adjacent middle divisions of same. —c. Portion of middle division of plant from shaded habitat. (a and b: *Hickey 898*, AAU; c: *Burger & Liesner 6349*, GH.)

to rounded or with a shallow central ridge, smooth and often shining, sometimes with a few inconspicuous, slightly protruding, blisterlike epidermal cells, with irregularly protruding, clear, marginal cells, green or yellowish tinged, not pruinous; sporangia 2–3 mm wide.

Huperzia talamancana grows as a terrestrial plant and under open scrub in páramo, in marshes and high swamps, often associated with *Sphagnum*. It appears to be rather frequent at high altitudes, mainly above 3,000 m in Costa Rica, and is known from two localities in western Panama. It belongs

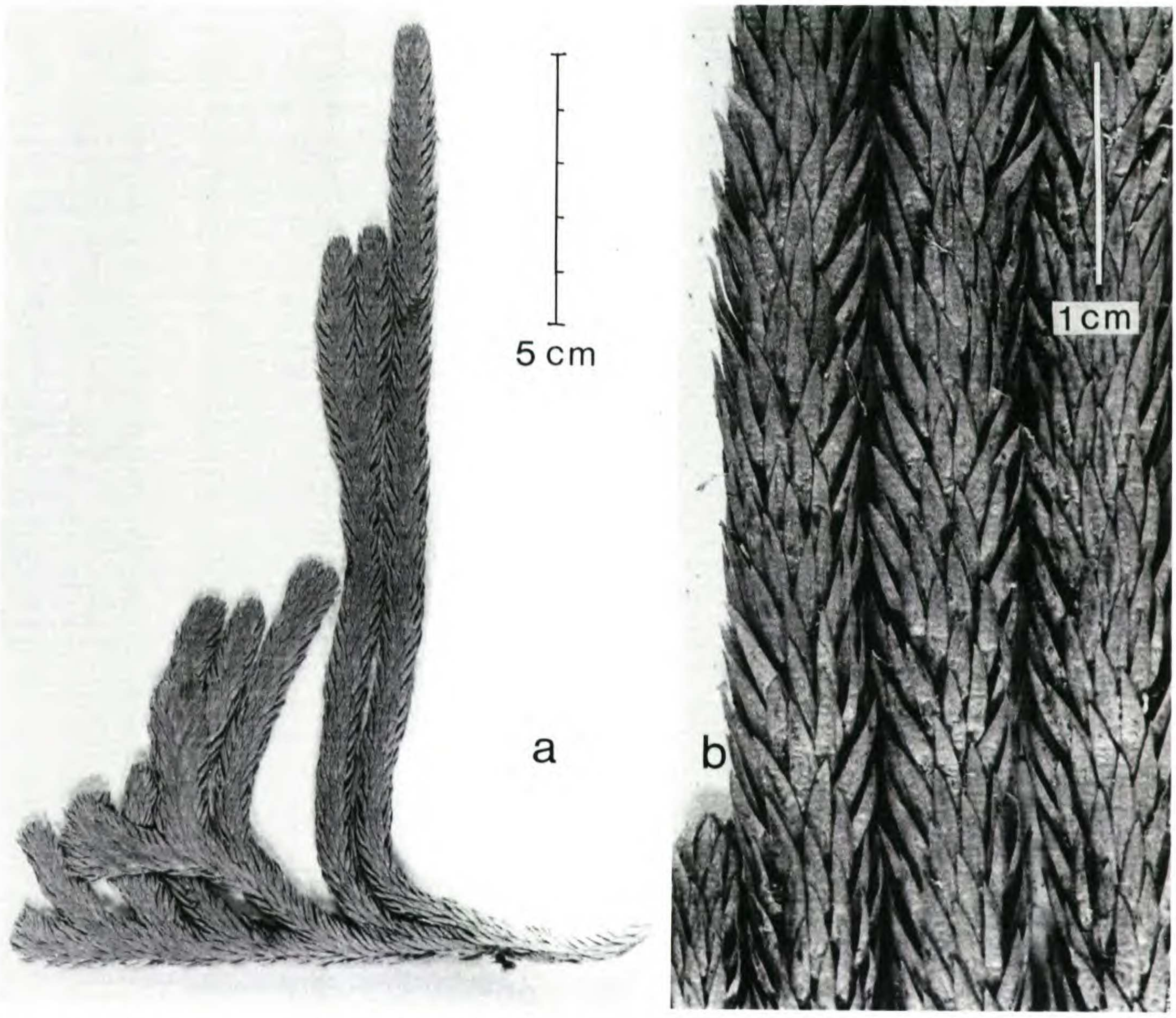

Figure 3. *Huperzia crassa* (Humboldt & Bonpland ex Willdenow) Rothmaler sens. lat. —a. Part of young plant with strongly heteroblastic basal divisions. —b. Portions of several middle divisions. (a: *Evans & Lellinger 143*, MO; b: *Davidse et al. 25941*, AAU.)

to the *Huperzia saururus* group (Øllgaard, 1987, 1989) and has commonly been included in a wide concept of *Huperzia saururus* (as *Lycopodium* or *Urostachys*); see, e.g., Lellinger (1989) and Rolleri (1977a, b, 1981). These authors emphasize similar features of specialized epidermal cells at the leaf margins. However, true *H. saururus*, as represented in the Andes from Peru to Argentina, besides Africa, differs from the present species in the strongly heteroblastic development of basal divisions, and the usually very tightly appressed leaves in the erect shoots. The erect shoots of *H. saururus* are densely aggregated and squeezed together at the base so that the lower leaves appear etiolated, and the horizontal divisions may have strongly reduced leaf development.

In herbaria this species has been referred to *Urostachys erikssonii* Nessel (type from Colombia), and *U. orionis* Herter (type from Venezuela) (Herter, 1958). The taxonomic identity of the types of these names is not well understood at present, but they do not correspond to any material I have seen from Central America.

Huperzia talamancana is apparently related to *H. crassa*, with which it often coexists in Costa Rica, and with which it has often been confused. *Huperzia crassa* (Fig. 3) differs from *H. talamancana* by the heteroblastic shoots (Fig. 3a), by the smaller and usually closely imbricate, somewhat pruinose leaves, (4–)5–8 × 1–1.5(–1.8) mm (Fig. 3b). The abaxial leaf epidermis is usually rugose due to protruding, blisterlike cells, while the margins have few or no specialized, protruding cells. In contrast, *H. talamancana* has homoblastic shoots (Fig. 2a), and leaves (6–)8–11 × (1.5–)2–3 mm, ascending to loosely imbricate (Fig. 2b, c), abaxially smooth and often shining, not pruinous, or sometimes with few protruding, blisterlike epidermal cells, while the margin

cells are specialized and usually individually protruding. It is a variable species, especially with regard to the direction of the leaves, responding strongly to the light conditions of the habitats, as shown by the specimens in Figure 2b, from a light-exposed habitat, and Figure 2c, from a somewhat shaded habitat.

Paratypes. COSTA RICA. SAN JOSE: Cerro de las Vueltas, 2,700–3,000 m, 1 Jan. 1926, *Standley & Valerio 43611* (US), *44004* (US), *44006* (F, US); Road Cartago–S. Isidro del General, km 88.5, Asunción, 3,335 m, 29 Jan. 1986, *A. Smith 2008* (MO, UC); Cerro de la Muerte, páramo de Buenavista, 1–3 km S of Interamerican Highway, 3,350 m, 9 Aug. 1967, *Lellinger 869* (US), *870* (MO, US); Cerro de la Muerte, N slopes, 11,000 ft., 25 May 1971, *Proctor 32070* (MO), 3,300–3,400 m, *Alverson 1853* (MO); Cerro Asunción, near Cerro de la Muerte, 3,335 m, 4 Aug. 1965, *Croat 507, 509* (MO), *Stone 2035* (UC); Cerro de la Muerte, 25 July 1983, *Hickey & Regan 890* (AAU); Asunción summit, 3,335 m, 22 July 1966, *Davidse & Pohl 10118* (MO); Hotel La Georgina–Cerro Frío, Cerro de la Muerte, 3,100–3,400 m, 9°33′N, 83°43–46′W, *Davidse et al. 25008* (AAU, UC); Cerro de la Muerte, km 91 of Pan American Highway in Cordillera de Talamanca, 3,300 m, *Whitmore 41* (F, GH); Cerro de la Muerte, 3,200 m, *Burch 4731* (MO); Cerro de la Muerte, 3,200 m, *Lorence 1751* (MO), *1752* (MO); Cerro de la Muerte, 3,400 m, *Taylor 11730* (MO); Cerro de la Muerte, páramo Buena Vista, 1–3 km S of Interamerican Highway, 3,350 m, *Mickel 3249* (UC, US); páramo de Buenavista, 3,400 m, 14 June 1967, *de la Sota 5047* (US); Cerro de la Muerte, 3,300 m, 7 Aug. 1976, *Solomon 2532* (MO). SAN JOSE–CARTAGO: near Asunción, 9°34′N, 83°45′W, 3,300–3,400 m, *Burger & Stolze 5982* (F, MO), *5977* (F, GH), *5985* (F, MO); Interamerican Highway near La Asunción, 3,200–3,300 m, 9°34′N, 83°45′W, 21 Nov. 1969, *Burger & Liesner 6349* (F, GH, MO); Cerros Cuericí, 9°35′N, 83°38′W, 3,200 m, *Davidse 24762* (AAU); páramo at La Asunción, 3,335 m, *Mickel 2117* (US), *2118* (US), *2120* (NY). CARTAGO: Cerro de la Muerte, La Virgen de los Angeles páramo, 3,000 m, *Brown CR-88* (US); Talamanca range, near Pan American Highway, 3,400 m, 25 Feb. 1965, *Lent 392* (F); San Isidro del General–Cartago, 3,400 m, 11 Jan. 1964, *McKee 11203* (P, UC, US); Cordillera Talamanca, 3,300 m, 25 Aug. 1961, *C. Weber 6067* (US); Cerro de la Muerte, 3,000 m, 19 Feb. 1957, *M. Carlson 3512* (GH); Cerro de la Muerte, La Virgen de los Angeles páramo, 3,470 m, *Godfrey 66717* (GH); Cerro Sakina, páramo Buena Vista, 3,000 m, *Churchill 3367* (AAU); Cerro de la Muerte, páramo de Buena Vista, E side, 3,000 m, 24 Jan. 1981, *Churchill 3711* (AAU); Cerro Buenavista, 3,000–3,300 m, 12 May 1982, *Huft et al. 2141* (AAU); Cordillera Talamanca, Mt. Cerro de la Muerte, El Alto de Asunción, 3,335 m, 4 Mar. 1966, *Molina R. et al. 18338* (F, US); Cerro de la Muerte, 3,200 m, 17 May 1956, *L. O. Williams 20052* (US), 3,300 m, 30 Mar. 1949, *L. O. Williams 16087* (F, MO, US), 3,200 m, 9°35′N, 83°45′W, 1 Feb. 1965, *L. O. Williams et al. 28833* (F, GH, US); Cerro de la Muerte, 11,000 ft., 11 July 1961, *Brown C. A. CR-88* (US). LIMON: SW foot of Cerro Kámuk, 9°16′N, 83°02′W, 3,200–3,350 m, *Davidse et al. 25978* (MO). HEREDIA: Buenavista Massive, 10,900 ft., 33 mi. NW of San Isidro del General, 31 July 1964, *Woodruff s.n.* (US). PANAMA. CHIRIQUI: Volcán de Chiriquí, Loma Larga to summit, 2,500–3,380 m, 4–6 July 1938, *Woodson et al. 1079* (GH, MO, US). BOCAS DEL TORO: between Itamut and Bine peaks, Fabrega Massif, 3,200 m, 5–9 Mar. 1984, *Gómez et al. 22259* (AAU, UC).

Huperzia curvifolia (Kunze) Holub var. **parvifolia** (Nessel) B. Øllgaard, comb. nov. Basionym: *Urostachys verticillatus* (L. f.) Herter var. *parvifolius* Nessel, Revista Sudamer. Bot. 6: 163, f. 43. 1940. TYPE: Costa Rica. Volcán Barba, *Brade & Brade 283* (HB not seen, BONN-Herb. Nessel no. 247).

Lycopodium verticillatum L. f. var. *parvifolium* (Nessel) Lellinger, Proc. Biol. Soc. Wash. 89: 719. 1977.

The material treated under this name is variable and referred here tentatively. Most specimens are somewhat intermediate between *Huperzia acerosa* and *H. curvifolia* var. *curvifolia* (Andes). Some specimens approach slender forms of *H. filiformis*. In general, the distinction of species in this group is problematic. *Huperzia curvifolia* var. *curvifolia* is an extremely thin form, with almost capillary stems, strongly upward curved leaves in proximal divisions, and closely appressed and reduced nonsporangiate leaves in the narrow, distal divisions. Variety *parvifolia* has thicker stems and is larger, with slightly less closely appressed nonsporangiate leaves in distal divisions, but shares the upward curved leaves in proximal divisions with the type variety.

The epithet *parvifolia* is unfortunate in the present context because it does not describe the relation to the type variety, but it is the only legitimate choice.

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